

CLAIMS

1. A process for prereforming a feedstock, said process comprising:
providing a reactor having a catalyst, wherein the catalyst contains an amount of nickel effective to catalyze the prereforming;
providing the feedstock in the reactor, wherein the feedstock comprises steam, hydrogen, and natural gas containing higher hydrocarbons along with methane;
adding an oxidant to the feedstock, wherein the oxidant provides oxygen in an amount insufficient to partially oxidize all of the higher hydrocarbons to a mixture of carbon monoxide and hydrogen; and
reacting the oxidant with the higher hydrocarbons in the feedstock to provide a gaseous mixture containing methane, carbon monoxide, carbon dioxide, steam and hydrogen, wherein said gaseous mixture is substantially free of higher hydrocarbons and oxygen, to thereby prereform the feedstock.
2. The process according to claim 1, wherein the oxidant is air or oxygen.
3. The process according to claim 1, wherein the oxidant provides less than one-half of the oxygen required to partially oxidize all of the higher hydrocarbons to a mixture of carbon monoxide and hydrogen.
4. The process according to claim 1, wherein the oxidant provides less than one-fourth of the oxygen required to partially oxidize all of the higher hydrocarbons to a mixture of carbon monoxide and hydrogen.
5. The process according to claim 1, wherein the reactor is a reformer, and the prereforming process is carried out in a top portion of the reformer.
6. The process according to claim 1, wherein the reactor is a prereformer.
7. The process according to claim 6, wherein the reactor is an adiabatic reactor.

8. The process according to claim 7, wherein the reactor is operated at a pressure of 100 to 600 psig, and the feedstock is heated to a temperature of 300 to 600°C before the feedstock is provided to the reactor.
9. The process according to claim 8, wherein the oxidant provides less than one-half of the oxygen required to partially oxidize all of the higher hydrocarbons to a mixture of carbon monoxide and hydrogen.
10. The process according to claim 8, wherein the oxidant provides less than one-fourth of the oxygen required to partially oxidize all of the higher hydrocarbons to a mixture of carbon monoxide and hydrogen.
11. The process according to claim 5, wherein the reactor is operated at a pressure of 100 to 600 psig and the feedstock is heated to a temperature of 400 to 650°C before the feedstock is provided to the reactor.
12. The process according to claim 11, wherein the oxidant provides less than one-half of the oxygen required to partially oxidize all of the higher hydrocarbons to a mixture of carbon monoxide and hydrogen.
13. The process according to claim 11, wherein the oxidant provides less than one-fourth of the oxygen required to partially oxidize all of the higher hydrocarbons to a mixture of carbon monoxide and hydrogen.
14. The process of claim 1, wherein the amount of nickel in the catalyst is at least 1 wt%.
15. The process of claim 1, wherein the gaseous mixture is reformed.

16. An apparatus adapted to perform the process of claim 1, said apparatus comprising:

a reactor;

a feedstock source comprising steam, hydrogen, and natural gas containing higher hydrocarbons along with methane;

an oxidant source;

valves and pipes connecting the feedstock source, the oxidant source and the reactor; and

a nickel-containing catalyst within the reactor.